EXECUTIVE SUMMARY
FINAL REPORT ARTI-21CR/612-40080-03
PORTABLE MODE DETECTORS – OPERATING REQUIREMENTS

At present, there are no good instruments for locating mold hidden behind walls, under floor tiles, above ceilings and under finishes. Unless the mold is visible, or can be cultured from surface samples, there is no alternative to pulling apart or drilling into materials to find hidden biocontamination. These techniques are costly, destructive, time consuming and they may also spread any biocontamination present.

Preliminary experiments at Georgia Tech Research Institute (GTRI) demonstrated that radar technology holds promise for detecting mold, and it may be packaged in the form of a lightweight, portable and economical instrument. To investigate this possibility and the key issues that relate to it, a three-part project was undertaken:

I. Radar laboratory investigation
II. Definition of operational requirements
III. Investigation of alternative technologies

GTRI researchers have investigated the use of microwave sensing to detect mold growing on the back of wallboard. This investigation has included the development of two laboratory systems to sense a change in the dielectric constant, caused by a change in moisture, on the back of wallboard and also within the wallboard itself. GTRI researchers have demonstrated in the laboratory environment that the change in dielectric constant caused by the moisture content of mold can be detected and mapped to the mold's location on the back of wallboard. The future challenge is to develop a system that can be taken into the field by a mold remediation practitioner. GTRI researchers have considered several concepts for the development of a small portable system that will allow a practitioner to take the system into the field and quickly scan a wall with the system. Imaging of the inside of the wall and any mold growing hidden on the back of the wallboard is thought possible, given the techniques that have been developed on the current research program. However, it is worth noting that the techniques developed in the laboratory resulted in the detection of moisture primarily, and additional resources are needed to further optimize the developed techniques to unequivocally distinguish mold growth from moisture alone.

In addition to the radar laboratory examination, this investigation established the operating requirements for a portable mold detector through field visits and interviews with technology stakeholders, and concluded that a mold detector would be useful even if it can only locate the areas of very heavy mold growth—because those are the circumstances most likely to generate a large enough problem to involve third parties. No doubt there are many problems caused by hidden mold growth at low levels, many of which are never understood to be mold problems by either the occupants or owners. In addition, if a portable detector could locate such low levels of growth, it would be an

even more useful device. But at present, even a device that only detects prolific mold growth (visible growth) in hidden locations would be useful.

Although radar shows the most promise for mold growth detection, this investigation explored also other potential technologies to supplement the laboratory-based efforts using radar to detect hidden mold. Surveyed technologies included gamma-ray imaging, neutron beam analysis, X-ray imaging, and T-ray imaging. It was concluded that all four technologies examined show some promise of being able to detect mold, or at least to detect hidden pockets of moisture inside building assemblies. However, it was found that there are issues of cost, safety and portability that eliminate the technologies from practical consideration. Many resources would be needed to address those limitations and even at that level of commitment, one should expect many years of work to investigate them with respect to mold detection.